

IN THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the Application:

LISTING OF CLAIMS:

1. (Currently amended) [[A]] The data storage system of claim 35, wherein the multiple small form factor magnetic disk drives include: device, the device comprising:
more than two disk drives having platter sizes less than 3.5 inches in diameter; and
wherein the second-tier RAID control circuitry includes:
a controller that accesses the disk drives having platter sizes less than 3.5 inches in diameter in response to received I/O requests, where said controller simultaneously performs at least a part of at least two write operations onto said more than two disk drives in response to at least two different write requests, ~~wherein the controller is configured to implement a RAID scheme, and wherein the RAID scheme is independent of a hierarchically higher RAID controller that sends the data storage device RAID data.~~
2. (Currently amended) The data storage system device of claim 1, further comprising a device interface to receive I/O requests, wherein the device interface comprises an interface configured to conform to a protocol.
3. (Currently amended) The data storage system device of claim 2, wherein the protocol comprises at least one of the following: SCSI (Small Computer System Interface), Fibre Channel, and INFINIBAND.
4. (Currently amended) The data storage system device of claim 1, wherein the platter sizes comprise platters of at least one of the following sizes: 2.5 inches, 1.8 inches, and 1 inch.

5. (Currently amended) The data storage system ~~device~~ of claim 4, wherein at least one of the disk drives comprises an IDE (Integrated Disk Electronics) drive.
6. (Currently amended) The data storage system ~~device~~ of claim 1, wherein the more than two disk drives having platter sizes less than 3.5 inches in diameter comprise more than two disk having platter sizes 2.5 inches or less in diameter.
7. (Currently amended) The data storage system ~~device~~ of claim 1, wherein the more than two disk drives having platter sizes less than 3.5 inches in diameter comprise more than two disk drives having platter sizes one inch in diameter or less.
8. (Currently amended) The data storage system ~~device~~ of claim 1, further comprising a housing.
9. (Currently amended) The data storage system ~~device~~ of claim 8, wherein the housing has one of the following form factors: standard, half-height, and low-profile.

Claims 10-11. (Canceled)

12. (Currently amended) The data storage system ~~device~~ of claim 1, wherein the RAID data comprises at least one of: a stripe, an error detection code, and an error correction code.
13. (Currently amended) The data storage system ~~device~~ of claim 1, wherein said data storage device is configured to perform cache operations, said data storage device further comprising a cache manager.
14. (Currently amended) The data storage system ~~device~~ of claim 13, wherein the cache manager comprises a manager configured to perform at least one of the following:

translate an address of a different storage device to a cache address; cache data included in a write request; load data from the different storage device; and remove cache data.

15. (Currently amended) The data storage system ~~device~~ of claim 1, further comprising a controller card that includes the controller and connections available to couple with more than one storage card that provides access to a least two of the disk drives.
16. (Currently amended) The data storage device of claim 15, wherein the storage card comprises a card having at least one parallel interface to a collection of the disk drives.
17. (Currently amended) The data storage system ~~device~~ of claim 15, wherein the drives comprise IDE (Integrated Disk Electronics) disk drives.
18. (Currently amended) The data storage system ~~device~~ of claim 15, wherein the connection between the controller and the storage card comprises a serial connection.
19. (Currently amended) The data storage system ~~device~~ of claim 15, wherein the controller comprises a bank interface that routes data requests to the appropriate bank of disk drives.
20. (Currently amended) ~~[[A]]~~ The data storage system of claim 35, wherein the set of storage devices includes: ~~the system comprising:~~
 - at least one first data storage device having a platter size of at least
 - ~~[[lest]]~~ 3.5 inches in diameter; and
 - wherein the set of storage sub-devices includes: ~~at least one second data storage device comprising:~~
 - ~~_____ a device interface for receiving input/output (I/O) requests;~~
 - ~~_____ a first controller configured to receive I/O requests from the~~
 - ~~interface; and~~

~~more than two disk drives coupled to the controller, the disk drives having platter sizes less than 3.5 inches in diameter, where said first controller simultaneously performs at least a part of at least two write operations onto said more than two disk drives in response to at least two different write requests, wherein the controller is configured to implement a RAID scheme, and wherein the RAID scheme is independent of a hierarchically higher RAID controller that sends the data storage device RAID data; and~~

~~—— a second controller, configured as the hierarchically higher RAID controller, that coordinates data access to the at least one first data storage device and the at least one second data storage device.~~

Claim 21. (Canceled)

22. (Currently amended) The data storage system of claim 20, wherein the platter sizes less than 3.5 inches in diameter comprise platters of at least one of the following sizes: 2.5 inches, 1.8 inches, and 1 inch.
23. (Currently amended) The data storage system of claim 20, wherein the drives having platter sizes less than 3.5 inches comprise IDE (Integrated Disk Electronics) disk drives.

Claims 24-30. (Canceled)

31. (Currently amended) The data storage system of claim 35 ~~[[30]]~~ wherein the first-tier RAID control circuitry and the second-tier RAID control circuitry define a RAID hierarchy.

Claim 32. (Canceled)

33. (Currently amended) The data storage system device of claim 35 ~~[[1]]~~ wherein the ~~controller~~ the first-tier RAID control circuitry comprises a cache manager configured to perform an operation selected from the group consisting essentially of: translate an address of a data storage device having a platter size of at least ~~[[least]]~~ 3.5 inches in diameter to an address associated with the more than two disk drives, cache data associated with a received I/O request, load data from the data storage device having the platter size of at least ~~[[least]]~~ 3.5 inches in diameter, and remove cached data from cache storage associated with the controller

Claim 34. (Canceled)

35. (Currently amended) A data storage system, comprising:
a set of storage devices, each storage device being configured to store and retrieve data in response to data access commands from a set of external host computers;
first-tier RAID control circuitry coupled to the set of storage devices, the first-tier RAID control circuitry being configured to apply a first RAID scheme on the set of storage devices in a manner that treats the set of storage devices as a first array under application of the first RAID scheme; and
second-tier RAID control circuitry coupled to the array of storage devices, the second-tier RAID control circuitry being configured to apply a second RAID scheme on a set of storage sub-devices of a storage device of the set of storage devices in a manner that treats the set of storage sub-devices of that storage device as a second array under application of the second RAID scheme; ~~The data storage system of claim 30~~
wherein each storage device of the set of storage devices has at least one magnetic disk drive;
wherein the storage device having the set of storage sub-devices includes, as the storage sub-devices, multiple small form factor magnetic disk drives;
wherein the first-tier RAID control circuitry is adapted to treat each storage device of the set of storage devices as exactly one RAID device when applying the first RAID scheme to store particular data in the set of storage devices; and

wherein the second-tier RAID control circuitry is adapted to treat each storage sub-device of the set of storage sub-devices as exactly one RAID device when applying the second RAID scheme to store a portion of the particular data in the set of storage sub-devices in order to store the particular data in a RAID-within-RAID manner.